CURRICULUM VITAE

HONG QIAN

Olga Jung Wan Endowed Professor of Applied Mathematics

Department of Applied Mathematics, University of Washington, Seattle, WA 98195-3925
(206)-543-2584 (tel), (206)-685-1440 (fax), hqian@u.washington.edu

September, 2019

Education & Training

1992-1994	Postdoctoral Fellow, California Institute of Technology, Pasadena. Mathematical biology and neural computation (with J.J. Hopfield)
1990-1992	Postdoctoral Fellow, University of Oregon, Eugene. Biophysical chemistry of peptides, proteins, and DNA (with J.A. Schellman)
1983-1989	Ph.D., Washington University, St. Louis. Biochemistry and Biophysics. Dissertation: Biophysical characterization of biopolymer solutions and gels by fluorescence fluctuation studies (with E.L. Elson)
1978-1982	B.A., Peking University, Beijing. Astrophysics. Thesis: The density wave theory with finite z-distribution for galactic spiral structures (with Z.-Y. Yue)

Professional Experience

2017.9-	Olga Jung Wan Endowed Professor of Applied Mathematics, Univ. of Washington.
2011.7-2011.8	Tang Ao-Qing Visiting Professor, College of Mathematics, Jilin University, Changchun.
2008.9-2008.10	Visiting Professor, School of Mathematical Sciences, Fudan University, Shanghai.
2008.6-2008.7	Visiting Professor, Département de Chimie, École Normale Supérieure, Paris.
2006-2008	Boeing Endowed Professorship, University of Washington.
2006-	Adjunct Professor, Bioengineering, University of Washington.
2006-2017	Professor of Applied Mathematics, University of Washington.
2005.6-2005.7	Visiting Professor, Center for Theoretical Biology, Peking University, Beijing.
2003-2006	Associate Professor of Applied Mathematics, University of Washington.
1997-2003	Assistant Professor of Applied Mathematics, University of Washington.
1997-2003	Associate Director, National Simulation Resource, Univeresity of Washington.
1994-1997	Adjunct Assistant Professor of Biomathematics, UCLA School of Medicine.

Honors & Awards

1992-1994	Fellow, Program in Mathematics and Molecular Biology at the University of California at Berkeley, supported by the National Science Foundation.
2002-2003	Royalty Research Fund, University of Washington.
2010	Fellow, American Physical Society, Division of Biological Physics.

Professional Activities

2004	Member, NIH Modeling and Analysis of Biological Systems Study Section.
2004	Organizer, Institute of Pure and Applied Mathematics Workshop on Molecular Machines, Los Angeles, May, 2004.
2004	Organizer, Symposium on Stochastic Modeling in Biology, Annual Meeting of Society for Mathematical Biology, Ann Arbor, July, 2004.
2004-2007	Member, Advisory Board, *Biophysical Chemistry*.
2004-now	Member, Editorial Board, *Molecular & Cellular Biomechanics*.
2005	Member, Program Committee, IEEE Computer Society Bioinformatics Conference, Stanford, August, 2005.
2005	Member, NSF-NIGMS Mathematical Biology Grant Applications Review Panel.
2006	Member (*ad hoc*), NIH Modeling and Analysis of Biological Systems (MABS) Study Section.
2008-2013	Member, Editorial Board, *Journal of Biophysics*.
2008.10	Member (*ad hoc*), NIH Multiscale Physiome Modeling Study Section.
2009	Organizer, Kavli Institute for Theoretical Physics China, Program on "Function and Dynamics of Biomolecules", July-August, 2009.
2010-2011	Member, Editorial Board, *Frontiers in Systems Biology.*
2010-2012	Member, Editorial Board, *Computers in Biology and Medicine*.
2010-now	Member, Editorial Board, *BMC Systems Biology*.
2011	Founding Vice Chair, Gordon Research Conference on "Stochastic Physics in Biology".
2012	Member, NIH Study Section on New Biomedical Frontiers at the Interface of the Life and Physical Sciences
2013	Chair, Gordon Research Conference on "Stochastic Physics in Biology".
2013-now	Member, Editorial Board, *Quantitative Biology* (Springer).
2013	Organizer, Kavli Institute for Theoretical Physics China, Program on "Small system nonequilibrium fluctuations, dynamic, stochastic, and anomalous behavior", July-August, 2013.
2016	Organizer, Kavli Institute for Theoretical Physics China, Program on "Nonequilibrium processes at the nanoscale", July-September, 2016.
2018-now	Member, Editorial Board, *Physiological Reviews* (American Physiological Society).

Teaching Experiences

Undergraduate and graduate *Biophysical Chemistry*; undergraduate, graduate, and specialized *Mathematical Biology, Stochastic Mathematics in Biology*, and *Mathematical Genomics*; undergraduate course on *Mathematical Modeling with Continuous Methods*, undergraduate and graduate course on *Dynamical Systems* and *Applied Stochastic Analysis*, graduate course on *Advanced Methods for Ordinary Differential Equations*.

Research Interests

Stochastic analysis and statistical physics of living systems: **stochastic dynamics, systems biology of cells, nonequilibirum processes, molecular biophysics, and mathematical biology.**

(1) *Dynamic formulation of complex (nonlinear and nonequilibrium) systems, including cellular and evolutionary dynamics*: thermodynamics, reversibility, entropy production, large deviations, and phase transition.

(2) *Systems biology of cells*: large-scale metabolic and protein interaction networks, cellular signal transduction, and biophysics of muscle contraction and cell motility.
(3) *Physical chemistry of single molecules and fluctuation measurements and analysis*: stochastic macromolecular mechanics, fluorescence correlation spectroscopy, single-particle tracking, atomic force microscopy, and single-molecule enzymology.
(4) *Biophysical chemistry*: protein folding and molecular motors.
(5) *Mathematical modeling*: electrophysiology and neural computation, cancer carcinogenesis and metastasis.

LIST OF TEACHING & SCHOLARLY ACTIVITIES

Teaching:

Amath 383 *Introduction to Continuous Mathematical Modeling*, Spring 1998, Winter 1999, Spring 2000, 2018, 2019, Winter 2011- 2014, 2016, Autum 2015.
Amath 402 *Ordinary Differential Equations, Nonlinear Dynamical Systems and Chaos*, Winter 2007, 2009.
Amath 422 *Introduction to Mathematical Biology*, Winter, 2000, 2003, 2005. Autumn 2006-2009, Winter 2014.
Amath 423A *Mathematical Biology: Stochastic Models*, Spring 1998-2006, Winter 2007-2010, 2019.
Amath 423 *Mathematical Analysis in Biology and Medicine*, Spring, 2011- 2015, Winter 2016, 2019.
Amath 503 *Mathematical Biology: Dynamic Models*, Autumn 1998-2001, 2003, 2004.
Amath 504 *Mathematical Biology: Spatial Models*, Spring, 2007, 2008, 2010.
Amath 519 *Introduction to Applied Stochastic Analysis*, Spring 2001.
Amath 531 *Mathematical Theory of Cellular Dynamics*, Autumn 2010, 2012, 2014, 2016, 2018.
Amath 532 *Mathematics of Genome Analysis and Molecular Modeling*, Autumn 2013.
Amath 568 *Advanced Methods for Ordinary Differential Equations*, Winter 2017, 2018.
Amath 572A *Deterministic and Stochastic Dynamical Systems*, Spring 2002-2004.
Amath 572 *Introduction to Applied Stochastic Analysis*, Spring 2006, 2008, 2010, 2012, 2014.

Amath 700 Master Thesis Research for A. Moore: "*Kinetic Model of Motor Protein Kinesin*", Winter 1999.
Amath 700 Master Thesis Research for C. Lambert: "*A Stochastic Model for Folded DNA*", Autumn 1998.

Genome 541 *Computational Molecular Biology* (in part, with W. S. Noble), Spring, 2012, 2014.
Genome 541 *Computational Molecular Biology* (in part, with J. Felsenstein), Spring, 2004, 2008, 2010.
Bioeng 575 *Molecular Modeling Methods* (participated, D.A. Beard), Winter 2002.
Bioeng 510 *Bioengineering Seminar Course* (participated, P. Vicini), Autum 2000.
Bioeng 510 *Bioengineering Seminar Course* (participated, M. Regnier), Autum 1999.
Bioeng 545 *Fractals in Biology and Medicine* (in part, with J.B. Bassingthwaighte), Autumn 1997.

Invited Talks Given in the Recent Years:

8/19 Department of Chemistry, Northwestern University, Evanston.
8/19 Department of Applied Mathematics, Illinois Institute of Technology, Chicago.
8/19 Department of Chemistry, University of Chicago, Chicago.

8/19 Department of Bioengineering, University of Illinois School of Medicine, Chicago.
7/19 International Workshop on Applications of Probability and Statistics to Biology, Fudan University, Shanghai.
7/19 Institute of Systems Biology, Shenzhen Bay Laboratory, Shenzhen.
7/19 School of Life and Health Sciences, The Chinese University of Hong Kong, Shenzhen.
7/19 Department of Mathematics, Sun Yat-Sen University, Guangzhou.
6/19 Northeast China Tianyuan Center for Mathematics, Jilin University, Changchun.
3/19 School of Life Sciences, Peking University, Beijing.
10/18 Plenary Speaker, SIAM Central States Section, University of Oklahoma, Norman.
7/18 Symposium on Data Science, Korean Institute for Basic Science, Seoul.
6/18 Institute of Applied Chemistry, Chinese Academy of Sciences, Changchun.
6/18 The 5th Chinese National Conference on Biophysical Chemistry, Taiyuan.
6/18 Division of Applied and Comput. Math., Beijing Computational Science Research Center, Beijing.
5/18 IMA workshop on Queueing and Networks, University of Minnesota, Minneapolis.
1/18 Biophysics Seminar, Department of Physics, Simon Fraser University, Canada.
12/17 Plenary Speaker, Conference on Computational Statistical Mechanics of Complex Systems, Fuzhou, China.
8/17 Workshop on Thermodynamics of Computation in Chemical and Biological Systems, Santa Fe Institute, Santa Fe, NM.
8/17 PIMS Workshop on Stochastic Nonlinear Dynamics, University of Alberta, Edmonton.
6/17 Workshop on Dynamics, Thermodynamics, and Information Processing in Chemical Networks, University of Luxembourg, Luxembourg.
5/17 Department of Biomathematics, University of California School of Medicine, Los Angeles, CA.
5/17 Molecular and Computational Biology, University of Southern California, CA.
4/17 Department of Mathematics and Statistics, University of Massachusetts, Amherst, MA.
4/17 Computational Biology Seminar, University of Pennsylvania, Philadelphia, PA.
4/17 American Mathematical Society Springer Western Sectional Meeting, Pullman, WA.
1/17 4th Gordon Research Conference on Stochastic Physics in Biology, Ventura, CA.
10/16 Computational Molecular Biology Seminar, University of Washington School of Medicine.
8/16 Physical Chemistry Seminar, Institute of Chemistry, Chinese Academy of Science, Beijing.
8/16 Zhou Peiyuan Center for Applied Mathematics, Tsinghua University, Beijing.
8/16 International Workshop on Nonequilibrium Statistical Physics & Active Matter Systems, Institute of Theoretical Physics, Chinese Academy of Science, Beijing.
8/16 Workshop on Morphogenesis and Cell Mechanics: Bridging the Scales from Molecular Biology to Tissue Development, Kavli Institute for Theoretical Physics China, Beijing.
8/16 Institute for Mathematical Sciences, Renming University, Beijing.
8/16 Division of Mechanics, Beijing Computational Science Research Center, Beijing.
8/16 Workshop on Nonequilibrium Processes at the Nanoscale, Kavli Institute for Theoretical Physics China, Beijing.
8/16 Department of Physics, Beijing Normal University, Beijing.
6/16 Center for Quantitative Biology, Peking University, Beijing.
6/16 Center for Mathematical Sciences, Huazhong University of Science and Technology, Wuhan.
6/16 Biophysics Seminar, Department of Physics, Central China Normal University, Wuhan.
6/16 International Workshop on Analysis and Quantification of Noise in Biological Systems, Huazhong University of Science and Technology, Wuhan.
5/16 Séminaire de Mathématiques Supérieures, University of Alberta, Edmonton.
5/16 Frontier of Science Forum on Physical Biology, Chinese Academy of Science, Beijing.
4/16 Institute of Bioinformatics, University of Georgia, Athens, GA.
4/16 Department of Physics, Purdue University, West Lafayette, IN.
4/16 Physical Chemistry Seminar, Department of Chemistry, University of Washington.
12/15 ICMS/KNAW Complexity Science Winter School, Technical University of Eindhoven, Netherland.

8/15 8th International Congress on Industrial and Applied Mathematics, Beijing.
8/15 Summer School on Stochastic Dynamics, Institute of Mathematics and Systems Science, Chinese Academy of Sciences, Beijing.
6/15 Institute of Mechanics, Chinese Academy of Sciences, Beijing.
5/15 AIM Workshop on Stochastic Methods for Nonequilibrium Dynamical Systems, San Jose, CA.
3/15 2015 Eastern North America Region International Biometric Society Meeting, Miami, TX.
3/15 2015 March Meeting of the American Physical Society, San Antonio, TX.
1/15 3rd Gordon Research Conference on Stochastic Physics in Biology, Ventura, CA.
12/14 Institute of Mathematics, Academia Sinica, Taipei.
12/14 Department of Mathematics, National Taiwan University, Taipei.
12/14 Workshop on Analysis and Its Applications in Biology and Physiology, National Taiwan University, Taipei.
12/14 Institute of Chemistry, Academia Sinica, Taipei.
12/14 Institute of Physics, Academia Sinica, Taipei.
12/14 Workshop on Nanothermodynamics For Equilibrium and Non-Equilibrium, Lorentz Center, University of Leiden, Netherlands.
7/14 School of Physical Sciences, University of Science and Technology of China, Hefei.
7/14 Zhou Peiyuan Center for Applied Mathematics, Tsinghua University, Beijing.
6/14 Workshop on Stochastic Modelling in Ecosystems, University of Strathclyde, Glascow.
2/14 Seminar for Undergraduate Program of Applied and Computational Mathematical Sciences, University of Washington.
12/13 Mini-Symposium on Stochastic Biology and Chemical Networks, Luxembourg Centre for Systems Biomedicine, University of Luxembourg.
12/13 Solvay Workshop on Thermodynamics of Small Systems, Brussels, Belgium.
9/13 ElsonFest, Depart. of Biochem. and Mol. Biophys., Wash. U. School of Medicine, St. Louis.
9/13 Colloquium, Department of Mathematics, Washington University, St. Louis.
9/13 Theory seminar, Department of Physics, Washington University, St. Louis.
8/13 School of Mathematics and Statistics, Northeast Normal University, Changchun.
8/13 Center for Quantitative Biology, Peking University, Beijing.
8/13 Biodynamics Optical Imaging Center (BIOPIC), Peking University, Beijing.
7/13 Workshop on Information, probability and inference in Systems Biology, International Centre for Mathematical Sciences (ICMS), Edinburgh.
7/13 School of Life Sciences, Tsinghua University, Beijing.
7/13 Non-Equilibrium Phenomena, Spin Glasses, and Algorithms, Satellite Meeting of STATPHYS 25, Beijing.
5/13 Workshop on Stochastic Modeling of Biological Processes, Institute of Math. Appl., Minneapolis.
3/13 Frontier in Computational and Information Sciences Lecture Series, PNNL, Richland, WA.
10/12 Department of Physics, University of California, Berkeley.
9/12 Department of Mathematics, Penn State University.
8/12 Department of Chemistry, Norwegian University of Science and Technology, Trondheim.
8/12 6th International Workshop on Nonequilibrium Thermodynamics and 3rd Lars Onsager Symposium, Røros, Norway.
8/12 7th International Conference on Nonlinear Sciences and 11st Taiwan International Symposium on Statistical Physics (Taipei)
6/12 Workshop on Characterizing Landscapes: From Biomolecules to Cellular Networks, Telluride.
4/12 NIH Common Fund Single Cell Analysis Workshop, Bethesda.

10/11 Janelia Farm Conference on Single molecules meet systems biology, Washington D.C.
9/11 Laufer Center for Physical and Quantitative Biology Seminar, Stony Brook.
9/11 Department of Applied Mathematics & Statistics, Stony Brook.
9/11 Biophysics Seminar, Rice University, Houston.
9/11 The 22nd Annual NASA Space Radiation Investigators' Workshop, League City, TX.
9/11 Biophysics Seminar, Johns Hopkins University, Baltimore.
7/11 College of Mathematics, Jilin University, Changchun.
7/11 International Conference on Cancer Systems Biology (ICSB2011), Jilin, Changchun.
6/11 School of Mathematical Sciences, Peking University
5/11 Center for Nonlinear Phenomena and Complex Systems, Free University of Brussels, Belgium.
5/11 Snogeholm Workshop on Thermodynamics: Can macro learn from nano? Sweden.
4/11 Department of Applied Mathematics, University of Texas, Arlington.
4/11 NASA Space Radiation Program, Houston.
3/11 Pacific Northwest National Laboratory, Richmond, WA.
1/11 Department of Biostatistics, Fred Huchinson Cancer Research Center, Seattle.
12/10 Institute of Chemistry, Academia Sinica, Taipei.
12/10 Department of Physics, National Taiwan University, Taipei.
12/10 Institute of Physics, Academia Sinica, Taipei.
12/10 Workshop on Applied Mathematics in Biophysics, National Center for Theoretical Sciences, Hsinchu.
9/10 Mathematical Biology Seminar, Department of Mathematics, University of Utah, Salt Lake City.
9/10 Biophysics seminar, Department of Physics, University of Utah, Salt Lake City.
8/10 Workshop on Emergent Behavior of Biomolecular Ensembles and Networks, Kavli Institute of Theoretical Physics China, Beijing.
7/10 Zhou Peiyuan Center for Applied Mathematics, Tsinghua University, Beijing.
7/10 The 1st Chinese National Conference on Biophysical Chemistry, Beijing.
6/10 College of Life Sciences, Jilin University, Changchun.
6/10 College of Mathematics, Jilin University, Changchun.
5/10 ISTAR-NSF-NSA Workshop on Mathematical Foundations of Open Systems, University of Pennsylviana, Philadelphia.
4/10 Biophysics seminar, University of Illinois, Urbana-Champaign.
1/10 Workshop on Multiscale Stochastic Modeling of Cell Dynamics, Banff.
12/09 The 102nd Statistical Mechanics Conference, Rutgers.
10/09 Computational and Systems Biology seminar, University of Texas Southwestern Medical School, Dallas.
8/09 The 6th Meeting of Chinese Physicists Worldwide, Lanzhou.
7/09 The 355th Xiangshan Science Conference on Single-molecule Imaging, Spectroscopy and Manipulation of Biological Systems, Beijing.
6/09 International Workshop on Probability Theory**,** Statistics and Their Applications to Biology**,** Beijing.
5/09 Center of Theoretical Biophysics, University of Californian, San Diego.
5/09 Department of Mathematics, University of Pittsburgh, Pittsburgh.
9/08 School of Life Sciences, Fudan University, Shanghai.
9/08 School of Mathematical Sciecnes, Fudan University, Shanghai.
7/08 Département de Physique, École Normale Supérieure, Paris.
7/08 Département de Chimie, École Normale Supérieure, Paris.
6/08 XXI Sitges Confernece on Statistical Mechanics, Spain.

5/08 Washington University Division of Biology and Biomedical Sciences 35th Anniversary Symposium, St. Louis.
3/08 Applied Mathematics Seminar, York University, Toronto.
1/08 Workshop on Protein Folding, Institute of Mathematics and Its Applications, Minneapolis.
10/07 Chemical Engineering Departmental Seminar, University of Washington College of Engineering.
9/07 Institute of Applied Mathematics, University of British Columbia, Vancouver.
9/07 Mathematical Biology Seminar, University of British Columbia, Vancouver.
7/07 6th International Congress on Industrial and Applied Mathematics (ICIAM), Zurich.
7/07 Institute of Theoretical Physics, Chinese Academy of Sciences, Beijing.
7/07 Center for Theoretical Biology, Peking University, Beijing.
7/07 Compter Science and Applied Mathematics Joint Seminar, Jilin University, Changchun.
7/07 The 5th International Bioinformatic Workshop, Weihai, China.
6/07 Workshop on Stochasticity in Biochemical Reaction Networks, Banff.
6/07 Physiology and Biophysics Departmental Seminar, University of Washington School of Medicine.
4/07 Applied Mathematics Colloquia, University of Notre Dame.
4/07 Pharmolocogy Departmental Seminar, University of Washington School of Medicine.
10/06 Applied Mathematics Seminar, Michigan State University, East Lansing.
8/06 Workshop on Exploring the Mechanisms and Landscapes of Cellular Networks, Telluride.
6/06 Center for Theoretical Biology, Peking University, Beijing.
6/06 International Symposium on Systems Properties and Evolution in Cell Signaling, Beijing.
5/06 Applied Mathematics Seminar, University of Arizona, Tucson.
7/05 Institute of Theoretical Physics, Chinese Academy of Sciences, Beijing.
7/05 Zhou Peiyuan Center for Applied Mathematics, Tsinghua University, Beijing.
6/05 International Symposium on Protein Folding, Function and Dynamics, Beijing.
5/05 Indiana Seventh Biocomplexity Workshop, Bloomington.
4/05 Applied Mathematics Seminar, University of California, Irvine.
4/05 DOE-ACS Workshop on Single-molecule Research in the New Millennium, Washington D.C.
3/05 Chemical Physics Seminar, California Institute of Technology, Pasadena.
1/05 Department of Biostatistics and Biomathematics, Fred Hutchinson Cancer Research Center, Seattle.
11/04 Department of Chemistry, University of Wisconsine, Madison.
8/04 American Chemical Society Symposium on Biophysical Chemistry and Novel Imaging of Single Molecules and Single Cells, Philadelphia.
7/04 Society of Industrial and Applied Mathematics (SIAM) Life Science Symposium, Portland.
4/04 Wang Ying-lai Memorial Symposium, University of Texas Medical Branch, Galveston.
3/04 The Center for Studies in Physics and Biology, Rockefeller University.
3/04 Applied Mathematics Colloquium, Columbia University.
3/04 Workshop on Signal Transduction, Mathematical Bioscience Institute, Ohio State University.
2/04 Dept.of Biochemistry and Molecular Biophysics, Washington Univ. School of Medicine, St. Louis.
11/03 Chemistry and Chemical Biology Program, University of California School of Medicine, San Francisco.
03/03 American Chemical Society Symposium on Physical Chemistry of Molecular Motors, New Orleans.
10/02 Department of Mathematics, Georgia Institute of Technology, Atlanta.
6/02 Western Sectional Meeting of American Mathematical Society, Portland.
3/02 Molecular and Computational Biology, University of Southern California, Los Angeles
12/01 The 86th Statistical Mechanics Conference, Rutgers University.
3/01 Institute of Theoretical Physics, University of California, Santa Barbara.

2/01 The First Lucian Blersch Symposium on Advances in Science through Mathematics, St. Edward University, Austin, Texas.
11/00 Department of Physics, University of California, San Diego.
11/00 NASA Ames Research Center, Moffett Field, California.
10/00 Carl Zeiss International Symposium on Fluorescence Correlation Spectroscopy & Related Methods, St. Louis.
8/00 Annual Meeting of the Society for Mathematical Biology, Salt Lake City.
7/00 International Conference on Bioinformatics & Theoretical Biology, Peking University, Beijing.
5/00 Applied Mathematics Seminar, Program in Applied Mathematics, Stanford University.
4/00 Biophysics Program, University of California School of Medicine, San Francisco.
9/99 Symposium on Nonlinear Dynamics in Biology and Chemistry, University of California, Davis.
8/99 Workshop on Mathematical Cellular Biology, Pacific Institute for Mathematical Sciences, University of British Columbia, Vancouver, Canada.
1/99 Department of Biological Chemistry, Johns Hopkins Univeresity.
11/98 Department of Physics, Washington University, St. Louis.
11/98 Dept. of Biochemistry and Molecular Biophysics, Washington Univ. School of Medicine, St. Louis.
10/98 Biomedical Engineering Society Annual Meeting, Cleveland.
7/98 Department of Biochemistry, Stanford University Medical Center.
3/98 Sixth Annual Pacific Northwest Workshop in Mathmetical Biology, Friday Harbor Laboratories, WA.
3/98 Department of Mathematics, University of Science and Technology, Hong Kong.
3/98 Department of Biochemistry, University of Science and Technology, Hong Kong.
6/97 Institute of Molecular Biology, University of Oregon, Eugene.
2/96 Department of Biochemistry, Kansas State University, Manhattan.
2/96 Institute of Theoretical Dynamics, University of California, Davis.
11/95 Program in Bioengineering, Columbia University.

Refereee:

Applied Mathematics:
Bulletin of Mathematical Biology, Discrete and Continuous Dynamical Systems, Journal of Computational and Graphical Statistics, Journal of Atmospheric Sciences, Jounral of Computational Biology, Journal of Dynamics and Differential Equations, Journal of Mathematical Biology, Journal of Statistical Physics, Multiscale Modeling and Simulation, Mathematical and Computer Modeling, Mathematical Biosciences, SIAM Journal of Applied Mathematics, SIAM Journal of Uncertainty Quantification, SIAM Review.

Physics and Chemistry:
Advances in Protein Chemistry, Angewandte Chemie, Biophysical Journal, Chemical Physics Letters, Europhysics Letter; Journal of American Chemical Society; Journal of Chemical Physics, Journal of Physical Chemistry, Nature Physics, PCCP, Physica A, Physica D, Physics Letters A, Physical Review E, Physical Review Letters, Reviews of Modern Physics, Review of Scientific Instruments.

Biochemistry, Biology, and Bioengineering:
Annals of Biomedical Engineering, Bioinformatics, Biopolymers, BMC Bioinformatics, BMC Systems Biology, Biophysical Chemistry, Genomic Research, Journal of Bioinformatics and Computational Biology, Journal of Molecular Biology; Journal of Royal Society Interface, Journal of Theoretical Biology, Nature Oncogene, Nucleic Acids Research, PLoS Computational Biology, PLoS One, Proceddings of Royal Society Interface, Progress in Biophysics and Molecular Biology, Protein Engineering, Protein Science, Proteins: Structure-Function-Genomics.

General:

Comptes Rendus de L'Academie des Sciences, Proceedings of the National Academy of Sciences USA, Science, Nature.

Research Grants:

Principal Investigator, 2001-2002, "*Mathematical Modeling of Metabolic Networks and Algorithmic Development for High-throughput Multidimensional NMR Profiling*", NASA, $60,022.

Principal Investigator, 2002-2003, "*Mesoscopic Thermodynamic Basis of Nano-scale Motion*", Royalty Research Fund, Univ. of Washington, $20,000.

Associate Director, 1997-2002, (PI: J.B. Bassingthwaighte) "*National Simulation Resource Facility for Circulatory Transport and Exchange*" NIH P01, $3,000,000 total.

Co-PI, 2004-2008, (PI: D.A. Beard) "*Integrated Modeling of Cardiac Metabolism and Transport*", NIH R01 HL072011, $1,168,760 total.

Co-PI, 2004-2008, (PI: D.A. Beard) "*Quantitative Approach to the Analysis of Complex Biological Systems*", NIH R01 GM068610, $200,000 per year.

Co-PI, 2004-2008, (PI: K. Bomsztyk) "*Energy-based Protein Interaction Networks Application to hnRNP K protein*", NIH R01 GM04134/G232JA, $107,845 per year.

Investigator, 2005-2008, (PI: J.B. Bassingthwaighte) "*Multiscale Modeling of Cardiac Functions*", NIH R01 BES0506477, $343,000 total.

Investigator, 2005-2007, (PI: J. Mittler) "*Modeling the Flagella Regulon in Salmonella*", NIH R21 AI059513 $275,000 total.

Co-PI, 2009-2012, (PI: H. Sauro) "*Extension of Metabolic Control Analysis and Biochemical Systems Theory to Stochastic Systems*", NSF EF0827592, $660,000 total.

Investigator, Current, 2014-2019, (PI: S. Huang) "*Dynamics of non-equilibrium cell state transitions in cell populations*", NIH R01 GM109964, $1,700,000 total.

Services:

Post Doctoral Fellow Advised:

D. Brian Walton (VIGRE, 2002-2004), followed by an assistant professorship at James Madison University

Ph.D. Students Advised (as the chair/co-chair of Ph.D. committee):

Lisa Bishop, Applied Mathematics (2011), followed by a post doctoral fellow at UCSF.
Dean Gull, Applied Mathematics (2009), followed by a staff scientist at PNNL.
Mauricio del Razo (2016), followed by a post doctoral fellow at the Freie Universität Berlin.
William Heuett, Applied Mathematics (2005), followed by a fellow at NIDDK, NIH.
Viktoria Krupp Hsu, Applied Mathematics (2004), followed by a post doctoral fellow at Univ. of Utah.
Kyung Kim, Physics (2006), followed by a post doctoral fellow in Bioengineering, Univ. of Washington.
Woo Kim, Applied Mathematics (2012), unknown.
Christine Lind Cole (2011), followed by a teaching position at Seattle University.
Yi-An Ma (2017), followed by a post doctoral fellow at Univetsity of California Berkeley.
Gunog Justine Seo, Applied Math. (2008), followed by a post doctoral fellow at Univ. of Western Ontario
Pei-Zhe Shi, Applied Mathematics (2011), Wall street analyst.
Yi-Yi Shi, Applied Mathematics (2009), Wall street analyst.
Melissa Vellela, Applied Mathematics (2009), followed by a post doctoral fellow at UCLA Cardiology Lab.
Yue Wang, Applied Mathematics (2018), followed by a post doctoral fellow at IHÉS, Université Paris.

Felix X.-F. Ye, Applied Mathematics (2018), followed by a post doctoral fellow at Johns Hopkins Univ.

Member of Ph.D. Thesis Committee:

Trachette L. Jackson, Applied Mathematics (1998); Patrick Nelson, Applied Mathematics (1998); Kristin Swanson, Applied Mathematics (1999); Steve P. Lee, Biomathematics, UCLA (2001); Blessing Mudavanhu, Applied Mathematics (2002); Katie Coughlin, Applied Mathematics (2003); Timothy Reluga, Applied Mathematics (2004); Dave Williams, Applied Mathematics (2005); Jihyoun Jeno, Applied Mathematics (2007); Rafael Meza, Applied Mathematics (2006); Elef Gkioulekas, Applied Mathematics (2006); Santosh K. Srivastava, Applied Mathematics (2008)

Master Students Advised (as the chair):

Bruce E. Shapiro, Biomathematics UCLA (1996), now a research scientist at JPL.
Charla Lambert, Applied Mathematics (1998), now Ph.D. student in Genome Sciences.
Ayana Moore, Applied Mathematics (1999), now Ph.D. student in Biophysics and Physiology.
Mark Seligman, Chemistry (2004), now Ph.D. student in statistics.
Stephen Maley, Applied Mathematics (2004), now Ph.D. student in Cellular and Molecular Biology.
Jonathan Bleyhl, Applied Mathematics (2004), now Ph.D. student in Genome Sciences.

Undergradaute student Advised:

Gilbert Martinez, Physics, now gradaute student in biophysics at Stanford University (2001)
Yik J. Low (Alex), Applied Computational Mathematical Sciences (2004)
Kyotaro Hemmi, Applied Computational Mathematical Sciences, graduating (2006)

Pre-General Exam Students Advised:

Max Giolitti, Bill Dougherty, Holly Dison, Guy Shefner, Dominique Wiest, Jonathon Watts.

Graduate Student Examination Committee:

Noah Malmstadt, Bioengineering (2000)
Joe Hindorff, Applied Mathematics (2001)
Michael Kellen, Bioengineering (2002)
Kalyan Vinnakota, Bioengineering (2003)
Bertrand C.W. Tanner, Bioengineering (2004)

LIST OF PUBLICATIONS

Books

1. Beard, D.A. and Qian, H. ***Chemical Biophysics: Quantitative Analysis of Cellular Systems***, Cambridge University Press (2008).
2. Ge, H. and Qian, H. ***Mathematical Kinetics Models: Applications in Biophysics and Biochemistry*** (in Chinese). Peking University Series in Contemporary Mathematics, Peking University Press (2017).

Refereed Research Publications

1. Qian, H. and Elson, E.L. Measurement of Diffusion in Closed Region by Fluorescence Photobleaching Recovery (An Appendix). *Journal of Cell Biology*, **106**, 1921-1923 (1988)

2. Qian, H. and Elson, E.L. Characterization of the Equilibrium Distribution of Polymer Molecular Weights by Fluorescence Distribution Spectroscopy (Theoretical Results). *Applied Polymer Symposium*, **43**, 305-314 (1989).

3. Sheetz, M.P., Turney, S., Qian, H., and Elson, E.L. Nanometre-Level Analysis Demonstrates That Lipid Flow Does Not Drive Membrane Glycoprotein Movements. *Nature*, **340**, 284-288 (1989).

4. Duszyk, M., Schwab, B., Zahalak, G.I., Qian, H., and Elson, E.L. Cell Poking: Quantitative Analysis of Indentation of Thick Viscoelastic Layers. *Biophysical Journal*, **55**, 683-690 (1989).

5. Qian, H. and Elson, E.L. Characterization of Confocal Laser Based Microscope - an optical sectioning microscopy approach. In *Optical Microscopy for Biology* (B. Herman & K.A. Jacobson eds.), Alan R. Liss, 119-130 (1990).

6. Qian, H. and Elson, E.L. On the Analysis of High Order Moments of Fluorescence Fluctuations. *Biophysical Journal*, **57**, 375-380 (1990).

7. Qian, H. and Elson, E.L. Distribution of Molecular Aggregation by Analysis of Fluctuation Moments. *Proceedings of the National Academy of Sciences USA*, **87**, 5479-5483 (1990).

8. Qian, H. Inverse Poisson Transformation and Shot Noise Filtering. *Review of Scientific Instruments*, **61**, 2088-2091 (1990).

9. Qian, H. On the Statistics of Fluorescence Correlation Spectroscopy. *Biophysical Chemistry*, **38**, 49-57 (1990).

10. Qian, H. and Elson, E.L. Analysis of Confocal Laser-Microscope Optics for Three-Dimensional Fluorescence Correlation Spectroscopy. *Applied Optics*, **30**, 1185-1195 (1991).

11. Qian, H., Sheetz, M.P., and Elson, E.L. Single Particle Tracking: Analysis of Diffusion and Flow in Two Dimensional Systems. *Biophysical Journal*, **60**, 910-921 (1991).

12. Scholtz, J.M., Qian, H., York, E.J., Stewart, J.M., and Baldwin, R.L. Parameters of Helix-Coil Transition Theory for Alanine-Based Peptides of Varying Chain Lengths in Water. *Biopolymers*, **31**, 1463-1470 (1991).

13. Qian, H., Elson, E.L., and Frieden, C. Studies of the Structure of Actin Gels Using Time Correlation Spectroscopy of Fluorescence Beads. *Biophysical Journal*, **63**, 1000-1010 (1992).

14. Qian, H. and Schellman, J.A. Helix-Coil Theories: A Comparative Study for Finite Length Polypeptides. *Journal of Physical Chemistry*, **96**, 3987-3994 (1992).

15. Qian, H. Single-Residue Substitution in Homopolypeptides: Perturbative Helix-Coil Theory at a Single Site. *Biopolymers*, **33**, 1605-1616 (1993).

16. Scholtz, J.M., Qian, H., Robbins, V.H., and Baldwin, R.L. The Energetics of Ion-Pair and Hydrogen-Bonding Interactions in a Helical Peptide. *Biochemistry*, **32**, 9668-9676 (1993).

17. Qian, H. A Thermodynamic Model for Helix-Coil Transition Coupled to Dimerization of Short Coiled-Coil Peptides. *Biophysical Journal*, **67**, 349-355 (1994).

18. Qian, H., Mayo, S.L., and Morton, A. Protein Hydrogen Exchange: Quantitative Analysis by a Two-process Model. *Biochemistry*, **33**, 8167-8171 (1994).

19. Qian, H. Prediction of α-helices in Proteins Based on Thermodynamic Parameters from Solution Chemistry. *Journal of Molecular Biology*, **256**, 663-666 (1996).

20. Qian, H. and Chan, S.I. Interactions Between a Helical Residue and Tertiary Structures: Helix Propensities in Small Peptides and in Native Proteins. *Journal of Molecular Biology*, **261**, 279-288 (1996).

21. Qian, H. and Hopfield, J.J. Entropy-Enthalpy Compensation: Perturbation and Relaxation in Thermodynamic Systems. *Journal of Chemical Phys*ics, **105**, 9292-9298 (1996).

22. Qian, H. Thermodynamic Hierarchy and Local Energetics of Folded Proteins. *Journal of Molecular Biology*, **267**, 198-206 (1997).

23. Shapiro, B.E. and Qian, H. A Quantitative Analysis of Single Protein-Ligand Complex Separation with the Atomic Force Microscope. *Biophysical Chemistry*, **67**, 211-219 (1997).

24. Qian, H. A Simple Theory of Motor Protein Kinetics and Energetics. *Biophysical Chemistry*, **67**, 263-267 (1997).

25. Doyle, R., Simons, K., Qian, H., and Baker, D. Local Interaction and the Optimization of Protein Folding. *Proteins: Structure, Function, and Genetics*, **29**, 282-291 (1997).

26. Klapper, I. and Qian, H. Remarks on Discrete and Continuous Large-Scale Models of DNA Dynamics. *Biophysical Journal*, **74**, 2504-2514 (1998).

27. Qian, H., Raymond, G.M., and Bassingthwaighte, J.B. On 2-Dimensional Fractional Brownian Motion and Fractional Browian Random Field. *Journal of Physics A: Mathematical and General*, **31**, L527-L535 (1998).

28. Shapiro, B.E. and Qian, H. Hysteresis in Force Probe Measurements: A Dynamic Systems Perspective. *Journal of Theoretical Biology*, **194**, 551-559 (1998).

29. Qian, H. A Vector Field Formalism and Analysis For A Class of Thermal Ratchets. *Physical Review Letters*, **81**, 3063-3066 (1998).

30. Qian, H. Entropy-Enthalpy Compensation: Conformational Fluctuation and Induced-Fit. *Journal of Chemical Physics*, **109**, 10015-10017 (1998).

31. Qian, H. and White, J.H. Terminal Twist Induced Continuous Writhe of a Circular Rod with Intrinsic Curvature. *Journal of Biomolecular Structure and Dynamics*, **16**, 663-669 (1998).

32. Sigg, D., Qian, H., and Bezanilla, F. Kramers' Diffusion Theory Applied to Gating Kinetics of Voltage-Dependent Ion Channels. *Biophysical Journal*, **76**, 782-803 (1999).

33. Vijayakumar, M., Qian, H., and Zhou, H.-X. Hydrogen Bonds Between Short Polar Side Chains and Peptide Backbone: Prevalence in Proteins and Effects on Helix-Forming Propensities. *Proteins: Structure, Function, and Genetics*, **34**, 497-507 (1999).

34. Qian, H. and Elson, E.L. Quantitative Study of Polymer Conformation and Dynamics by Single-Particle Tracking. *Biophysical Journal*, **76**, 1596-1605 (1999).

35. Qian, H. and Chan, S.I. Hydrogen Exchange Kinetics of Proteins in Denaturants: A Generalized Two-Process Model. *Journal of Molecular Biology*, **286**, 607-616 (1999).

36. Qian, H., Raymond, G.M., and Bassingthwaighte, J.B. Stochastic Fractal Behavior in Concentration Fluctuation and Fluorescence Correlation Spectroscopy. *Biophysical Chemistry*, **80**, 1-5 (1999).

37. Qian, H. and Shapiro, B.E. A Graphical Method for Force Analysis: Macromolecular Mechanics with Atomic Force Microscopy. *Proteins Structure, Function, and Genetics*, **37**, 576-581 (1999).

38. Qian, H. A Simple Theory of Motor Protein Kinetics and Energetics II. *Biophysical Chemistry*, **83**, 35-43 (2000).

39. Qian, H. Single-Particle Tracking: Brownian Dynamics of Viscoelastic Materials. *Biophysical Journal*, **79**, 137-143 (2000).

40. Qian, H. and Qian, M. Pumped Biochemical Reactions, Nonequilibrium Circulation, and Stochastic Resonance. *Physical Review Letters*, **84**, 2271-2274 (2000).

41. Qian, H. A Mathematical Analysis of the Brownian Dynamics of DNA Tether. *Journal of Mathematical Biology*, **41**, 331-340 (2000).

42. Qian, H. and Bassingthwaighte, J.B. A Class of Flow Bifurcation Models with Lognormal Distribution and Fractal Dispersion. *Journal of Theoretical Biology*, **205**, 261-268 (2000).

43. Qian, H. and Schellman, J.A Transformed Poisson-Boltzmann Relations and Ionic Distributions. *Journal of Physical Chemistry B*, **104**, 11528-11540 (2000).

44. Qian, H. The Mathematical Theory of Molecular Motor Movement and Chemomechanical Energy Transduction. *Journal of Mathematical Chemistry*, **27**, 219-234 (2000).

45. Qian, H. and Murray, J.D. A Simple Method of Parameter Space Determination for Diffusion-Driven Instability with Three Species. *Applied Mathematics Letters*, **14**, 405-411 (2001).

46. Qian, H. Mathematical Formalism for Isothermal Linear Irreversibility. *Proceedings of the Royal Society of London A: Mathematical, Physical and Engineering Sciences*, **457**, 1645-1655 (2001).

47. Qian, H. Relative Entropy: Free Energy Associated with Equilibrium Fluctuations and Nonequilibrium Deviations. *Physical Review E*, **63**, 042103:1-4 (2001).

48. Qian, H. Nonequilibrium Steady-state Circulation and Heat Dissipation Functional. *Physical Review E*, **64**, 022101:1-4 (2001).

49. Qian, H. Mesoscopic Nonequilibrium Thermodynamics of Single Macromolecules and Dynamic Entropy-Energy Compensation. *Physical Review E*, **65**, 016102:1-5 (2002).

50. Qian, H. Entropy Production and Excess Entropy in Nonequilibrium Steady-State of Single Macromolecules. *Physical Review E*, **65**, 021111:1-6 (2002).

51. Qian, H., Qian, M., and Tang, X. Thermodynamics of the General Diffusion Process: Stationary Distribution, Time-Reversibility and Entropy Production. *Journal of Statistical Physics*, **107**, 1129-1141 (2002).

52. Qian, H. Equations for Stochastic Macromolecular Mechanics of Single Proteins: Equilibrium Fluctuations, Transient Kinetics and Nonequilibrium Steady-State. *Journal of Physical Chemistry B*, **106**, 2065-2073 (2002).

53. Qian, H. From Discrete Protein Kinetics to Continuous Brownian Dynamics: A New Perspective. *Protein Science*, **11**, 1-5 (2002).

54. Beard, D.A., Liang, S.-D., and Qian, H. Energy Balance for Analysis of Complex Metabolic Network. *Biophysical Journal*, **83**, 79-86 (2002).

55. Qian, H. and Li, G.-P. Kinetic Timing: A Novel Mechanism for Improving the Accuracy of GTPase Timers in Endosome Fusion and Other Biological Processes. *Traffic*, **3**, 249-255 (2002).

56. Qian, H., Saffarian, S., and Elson, E.L. Concentration Fluctuations in a Mesoscopic Oscillating Chemical Reaction System. *Proceedings of the National Academy of Sciences USA*, **99**, 10376-10381 (2002).

57. Qian, H. and Elson, E.L. Single-Molecule Enzymology: Stochastic Michaelis-Menten Kinetics. *Biophysical Chemistry*, **101**, 565-576 (2002).

58. Qian, H., Liang, S.-D., and Beard, D.A Stoichiometric Network Theory for Nonequilibrium Biochemical Systems. *European Journal of Biochemistry*, **270**, 415-421 (2003).

59. Qian, H. Amplifying Signal Transduction Specificity Without Multiple Phosphorylation. *Biophysical Journal*, **84**, 1410 - 1411 (2003).

60. Qian, H. Thermodynamic and Kinetic Analysis of Sensitivity Amplification in Biological Signal Transduction. *Biophysical Chemistry*, **105**, 585-593 (2003).

61. Li, G.-P and Qian, H. Sensitivity and Specificity Amplification in Signal Transduction. *Cell Biochemistry and Biophysics*, **39**, 45-60 (2003).

62. Qian, H. A Motor Protein with Nonequilibrium Potential: Its Thermodynamics and Efficiency. *Physical Review E*, **69**, 012901:1-4 (2004).

63. Qian, H. and Elson, E.L. Fluorescence Correlation Spectroscopy with High-order and Dual-color Correlation to Probe Nonequilibrium Steady-states. *Proceedings of the National Academy of Sciences USA*, **101**, 2828-2833 (2004).

64. Qian, H. A stochastic analysis of a Brownian ratchet model for actin-based motility. *MCB: Molecular & Cellular Biomechanics*, **1**, 267-278 (2004).

65. Beard, D.A., Babson, E., Curtis, E., and Qian, H. Thermodynamic Constraints for Biochemical Networks. *Journal of Theoretical Biology*, **228**, 327-333 (2004).

66. Kim, K.H. and Qian, H. Entropy Production of Brownian Macromolecules with Inertia. *Physical Review Letters*, **93**, 120602 (2004).

67. Beard, D.A. and Qian, H. Thermodynamic-based Computational Profiling of Cellular Regulatory Control in Hepatocyte Metabolism. *American Journal of Physiology: Endocrinology and Metabolism*, **228**, E633-E644 (2005).

68. Qian, H. and Beard, D.A. Thermodynamics of Stoichiometric Biochemical Networks in Living Systems Far From Equilibrium. *Biophysical Chemistry*, **114**, 213-220 (2005).

69. Yang, F., Qian, H., and Beard, D.A. *Ab Initio* Prediction of Thermodynamically Feasible Reaction Directions from Biochemical Network Stoichiometry. *Metabolic Engineering*, **7**, 251-259 (2005).

70. Qian, H. and Reluga, T.C. Nonequilibrium Thermodynamics and Nonlinear Kinetics in Cellular Signaling Switch. *Physical Review Letters*, **94**, 028101 (2005).

71. Qian, H. Cycle Kinetics, Steady-state Thermodynamics and Motors -- A Paradigm for Living Matter Physics. *Journal of Physics: Condensed Matter*, **17**, S3783-S3794 (2005).

72. Min, W., Jiang, L., Yu, J., Kou, S.C., Qian, H. and Xie, X.S. Nonequilibrium steady state of a nanometric biochemical system: determining the thermodynamic driving force from single enzyme turnover time traces.. *Nano Letters*, **5**, 2373-2378 (2005).

73. Qian, H. Nonequilibrium Potential Function of Chemically Driven Single Macromolecules via Jarzynski-type Log-mean-exponential Work. *Journal of Physical Chemistry B*, **109**, 23624-23628 (2005).

74. Qian, H. An Asymptotic Comparative Analysis of the Thermodynamics of Non-covalent Association. *Journal of Mathematical Biology*, **52**, 277-289 (2006).

75. Heuett, W.J. and Qian, H. A stochastic model of oscillatory blood testosterone levels. *Bulletin for Mathematical Biology*, **68**, 1383-1399 (2006).

76. Heuett, W.J. and Qian, H. Grand canonical Markov model: a stochastic theory for open nonequilibrium biochemical networks. *Journal of Chemical Physics*, **124**, 044110 (2006).

77. Saffarian, S., Qian, H., Collier, I.E., Elson, E.L. and Goldberg G. Powering a burnt bridges Brownian ratchet: A model for an extracellular motor driven by proteolysis of collagen. *Physical Review E*, **73**, 041909 (2006).

78. Qian, H. and Xie, X.S. Generalized Haldane Equation and Fluctuation Theorem in the Steady State Cycle Kinetics of Single Enzymes. *Physical Review E (Rapid Communication)*, **74**, 010902 (2006).

79. Qian, H. and Wang, H. Continuous time random walks in closed and open single-molecule systems with microscopic reversibility. *Europhysics Letters*, **76**, 15-21 (2006).

80. Qian, H. Open-system nonequilibrium steady-state: statistical thermodynamics, fluctuations and chemical oscillations. *Journal of Physical Chemistry B (Feature Article)*, **110**, 15063-15074 (2006).

81. Li, Q.L., Barkess, G. and Qian, H. Chromatin looping and probability of transcription. *Trends in Genetics*, **22**, 197-202 (2006).

82. Qian, H. and Beard, D.A. Metabolic futile cycles and their functions: a systems analysis of energy and control. *IEE Proceedings-Systems Biology*, **153**, 192-200 (2006).

83. Shi, Y.Y., Miller, G.A., Qian, H. and Bomsztyk, K. Free energy distribution of binary protein-protein binding suggests cross-species interactome differences. *Proceedings of the National Academy of Sciences USA*, **103**, 11527-11532 (2006).

84. Heuett, W.J. and Qian, H. Combining flux and energy balance analysis to model large-scale biochemical networks. *Journal of Bioinformatics and Computational Biology*, **4**, 1227-1243 (2006).

85. Qian, H. Reducing intrinsic biochemical noise in cells and its thermodynamic limit. *Journal of Molecular Biology*, **362**, 387-392 (2006).

86. Qian, H. Phosphorylation energy hypothesis: open chemical systems and their biological functions. *Annual Review of Physical Chemistry*, **58**, 113-142 (2007).

87. Breard, D.A. and Qian, H. Relationship between thermodynamic driving force and one-way fluxes in reversible chemical reactions. *PLoS ONE*, **2**, e144 (2007).

88. Vellela, M. and Qian, H. A quasi-stationary analysis of a stochastic chemical reaction: Keizer's paradox. *Bulletin of Mathematical Biology*, **69**, 1727-1746 (2007).

89. Wang, H. and Qian, H. On detailed balance and reversibility of semi-Markov processes and single-molecule enzyme kinetics. *Journal of Mathematical Physics*, **48**, 013303 (2007).

90. Ao, P., Kwon, C. and Qian, H. On the existence of potential landscape in the evolution of complex systems. *Complexity*, **12**, 19-27 (2007).

91. Kim, K.H. and Qian, H. Fluctuation theorems of a molecular refrigerator. *Physical Review E*, **75**, 022102 (2007).

92. Miller, G.A., Shi, Y.Y., Qian, H. and Bomsztyk, K. Protein-protein interaction networks: beyond the power-law distribution. *Physical Review E*, **75**, 051910 (2007).

93. Shi, Y.Y, Miller, G.A., Denisenko, O., Qian, H. and Bomsztyk, K. Quantitative model for binary measurements of protein-protein interactions. *Journal of Computational Biology*. **14**, 1011-1023 (2007).

94. Ge, H., Qian, H. and Qian, M. Synchronized dynamics and nonequilibrium steady states in a stochastic yeast cell-cycle network. *Mathematical Biosciences*, **211**, 132-152 (2008).

95. Qian, H. and Cooper, J.A. Temporal cooperativity and sensitivity amplification in biological signal transduction. *Biochemistry*, **47**, 2211-2220 (2008).

96. Cooper, J.A. and Qian, H. A mechanism for Src kinase-dependent signaling by noncatalytic receptors. *Biochemistry*, **47**, 5681-5688 (2008).

97. Qian, H. Cooperativity and specificity in monomeric steady state enzyme: a single-molecule perspective. *Biophysical Journal*, **95**, 10-17 (2008).

98. Qian, H. Viscoelasticity of living materials: mechanics and chemistry of muscle as an active macromolecular system. *MCB: Molecular & Cellular Biomechanics*, **5**, 107-117 (2008).

99. Heuett, W.J., Beard, D.A. and Qian, H. Linear analysis near a steady-state of biochemical networks: control analysis, correlation metrics and circuit theory. *BMC Systems Biology*, **2**, 44 (2008).

100. Li, Y., Qian, H. and Yi, Y. Oscillations and multi-scale dynamics in a closed chemical reaction system: Second law of thermodynamics and temporal complexity. *Journal of Chemical Physics*, **129**, 154505 (2008).

101. Shi, Y.Y. and Qian, H. On the degree properties of generalized random graphs. *Communications in Mathematical Sciences*, **7**, 175-187 (2009).

102. Qian, H. and Shi, P.Z. Fluctuating enzyme and its biological functions: Positive cooperativity without multiple states. *Journal of Physical Chemistry B*, **113**, 2225-2230 (2009).

103. Vellela, M. and Qian, H. Stochastic dynamics and nonequilibrium thermodynamics of a bistable chemical system: the Schlögl model revisited. *Journal of the Royal Society Interface*, **6**, 925-940 (2009).

104. Qian, H., Shi, P.-Z. and Xing, J. Stochastic bifurcation, slow fluctuations, and bistability as an origin of biochemical complexity. *Physical Chemistry Chemical Physics*, **11**, 4861-4870 (2009).

105. Cady, F. and Qian, H. Open-system thermodynamic analysis of DNA polymerase fidelity. *Physical Biology*, **6**, 036011 (2009).

106. Ge, H. and Qian, H. Thermodynamic limit of a nonequilibrium steady-state: Maxwell-type construction for a bistable biochemical system. *Physical Review Letters*, **103**, 148103 (2009).

107. Wu, Z., Elgart, V., Qian, H. and Xing, J. Amplification and detection of single-molecule conformational fluctuation through a protein interaction network with bimodal distributions. *Journal of Physical Chemistry B*, **113**, 12375-12381 (2009).

108. Huang, Q. and Qian, H. Ultrasensitive dual phosphorylation dephosphorylation cycle kinetics exhibits canonical competition behavior. *Chaos: An Interdisciplinary Journal of Nonlinear Science*, **19**, 033109 (2009).

109. Qian, H. Entropy demystified: The ``thermo"-dynamics of stochastically fluctuating systems. *Methods in Enzymology*, **467**, 111-134 (2009).

110. Liang, J. and Qian, H. Computational cellular dynamics based on the chemical master equation: A challenge for understanding complexity. *Journal of Computer Science and Technology*, **25**, 154-168 (2010).

111. Bishop, L.M. and Qian, H. Stochastic bistability and bifurcation in a mesoscopic signaling system with autocatalytic kinase. *Biophysical Journal*, **98**, 1-11 (2010).

112. Zhu, H., Qian, H. and Li, G.-P. (2010) Delayed onset of positive feedback activation of Rab5 by Rabex-5 and Rabaptin-5 in endocytosis. *PLoS ONE*, **5**, e9226 (2010).

113. Vellela, M. and Qian, H. On Poincaré-Hill cycle map of rotational random walk: Locating stochastic limit cycle in reversible Schnakenberg model. *Proceedings of the Royal Society A: Mathematical, Physical and Engineering Sciences*, **466**, 771-788 (2010).

114. Ge, H. and Qian, H. The physical origins of entropy production, free energy dissipation and their mathematical representations. *Physical Review E*, **81**, 051133 (2010).

115. Li, Y., Qian, H. and Yi, Y. Nonlinear oscillations and multiscale dynamics in a closed chemical reaction system. *Journal of Dynamics and Differential Equations*, **22**, 491-507 (2010).

116. Qian, H and Bishop, L.M. The chemical master equation approach to nonequilibrium steady-state of open biochemical systems: Linear single-molecule enzyme kinetics and nonlinear biochemical reaction networks. *International Journal of Molecular Sciences*, **11**, 3472-3500 (2010).

117. Qian, H. Cyclic conformational modification of an enzyme: Serial engagement, energy relay, hysteretic enzyme, and Fischer's hypothesis. *Journal of Physical Chemistry B*, **114**, 16105-16111 (2010).

118. Qian, H. Cellular biology in terms of stochastic nonlinear biochemical dynamics: Emergent properties, isogenetic variations and chemical system inheritability. *Journal of Statistical Physics*, **141**, 990-1013 (2010).

119. Cole, C.L. and Qian, H. Simple chemical kinetic model for facilitated transport with an application to Wyman-Murray facilitated diffusion. *Acta Physico-Chimica Sinica*, **26**, 2857-2864 (2010).

120. Huang, Q. and Qian, H. The dynamics of zeroth-order ultrasensitivity: A critical phenomenon in cell biology. *Discrete and Continuous Dynamical Systems S*, **4**, 1457-1464 (2011).

121. Ge, H. and Qian, H. Nonequilibrium phase transition in mesoscoipic biochemical systems: From stochastic to nonlinear dynamics and beyond. *Journal of the Royal Society Interface*, **8**, 107-116 (2011).

122. Shi, P.-Z. and Qian, H. A perturbation analysis of rate theory of self-regulating genes and signaling networks. *Journal of Chemical Physics*, **134**, 065104 (2011).

123. Santillian, M. and Qian, H. Irreversible thermodynamics in multiscale stochastic dynamical systems. *Physical Review E*, **83**, 041130 (2011).

124. Zhou, D and Qian, H. Fixation, transient landscape and diffusion's dilemma in stochastic evolutionary game dynamics. *Physical Review E*, **84**, 031907 (2011).

125. Cole, C.L. and Qian, H. The Brownian ratchet revisited: Diffusion formalism, polymer-barrier attractions, and multiple filamentous bundle growth. *Biophysical Reviews and Letters*, **6**, 59-79 (2011).

126. Atkins, W.M. and Qian, H. Stochastic ensembles, conformationally adaptive teamwork and enzymatic detoxification. *Biochemistry (New Concept)*, **50**, 3866-3872 (2011).

127. Qian, H. Nonlinear stochastic dynamics of mesoscopic homogeneous biochemical reactions systems - An analytical theory. *Nonlinearity (Invited Article)*, **24**, R19-R49 (2011).

128. Zhang, X.-J., Qian, H. and Qian, M. Stochastic theory of nonequilibrium steady states and its applications (Part I). *Physics Reports*, **510**, 1-86 (2012).

129. Ge, H., Qian, M. and Qian, H. Stochastic theory of nonequilibrium steady states (Part II): Applications in chemical biophysics. *Physics Reports*, **510**, 87-118 (2012).

130. Wang, J.-Z., Qian, M. and Qian, H. Circular stochastic fluctuations in SIS epidemics with heterogeneous contacts among subpopulations. *Theoretical Population Biology*, **81**, 223-231 (2012).

131. Qian, H. Hill's small systems nanothermodynamics: A simple macromolecular partition problem with a statistical perspective. *Journal of Biological Physics* (Springer), **38**, 201-207 (2012).

132. Qian, H. Cooperativity in cellular biochemical processes: Noise-enhanced sensitivity, fluctuating enzyme, bistability with nonlinear feedback, and other mechanisms for sigmoidal responses. *Annual Review of Biophysics*, **41**, 179-204 (2012).

133. Ge, H. and Qian, H. Landscapes of non-gradient dynamics without detailed balance: Stable limit cycles and multiple attractors. *Chaos: An Interdisciplinary Journal of Nonlinear Science*, **22**, 023140 (2012).

134. Ge, H. and Qian, H. Analytical mechanics in stochastic dynamics: Most probable path, large-deviation rate function and Hamilton-Jacobi equation. *International Journal of Modern Physics B (Review)*, **26**, 1230012 (2012).

135. Qian, H. and Ge, H. Mesoscopic biochemical basis of isogenetic inheritance and canalization: Stochasticity, nonlinearity, and emergent landscape. *MCB: Molecular & Cellular Biomechanics*, **9**, 1-30 (2012).

136. Zhang, Y., Ge, H. and Qian, H. One-dimensional birth-death process and Delbrück-Gillespie theory of mesoscopic nonlinear chemical reactions. *Studies in Applied Mathematics*, **129**, 328-345 (2012).

137. Qian, H. and Roy S. An information theoretical analysis of kinase activated phosphorylation dephosphorylation cycle. *IEEE Transactions on NanoBioscience*, **11**, 289-295 (2012).

138. Li, Y., Qian, H., Wang, Y. and Cucinotta, F.A. A stochastic model of DNA fragments rejoining. *PLoS ONE*, **7**, e44293 (2012).

139. Qian, H. and Autzen, H.E. A little engine that could: ATP-powered electrical battery and heater inside cells. *Biophysical Journal* (New and Notable), **103**, 1409-1410 (2012).

140. Santillian, M. and Qian, H. Stochastic thermodynamics across scales: Emergent inter-attractoral discrete Markov jump process and its underlying continuous diffusion *Physica A*, **392**, 123-135 (2013).

141. Qian, H. Stochastic physics, complex systems and biology. *Quantitative Biology*, **1**, 50-53 (2013).

142. Qian, H. A decomposition of irreversible diffusion processes without detailed balance. *Journal of Mathematical Physics*, **54**, 053302 (2013).

143. Ge, H. and Qian, H. Heat dissipation and nonequilibrium thermodynamics of quasi-steady states and open driven steady state. *Physical Review E*, **87**, 062125 (2013).

144. Kim, K.H., Qian, H. and Sauro, H.M. Nonlinear biochemical signal processing via noise propagation. *Journal of Chemical Physics*, **139**, 144108 (2013).

145. Qian, H. The zeroth law of thermodynamics and volume-preserving conservative system in equilibrium with stochastic damping. *Physics Letters A*, **378**, 609-616 (2014).

146. Qian, H. and Kou, S.C. Statistics and related topics in single-molecule biophysics. *Annual Review of Statistics and Its Application*, **1**, 465-492 (2014).

147. Qian, H., Zhang, X.-J. and Qian, M. Stochastic dynamics of electrical membrane with voltage-dependent ion channel fluctuations. *Europhysics Letters*, **106**, 10002 (2014).

148. Del Razo, M.J., Pan, W.-X., Qian, H. and Lin, G. Fluorescence correlation spectroscopy and nonlinear stochastic reaction-diffusion. *Journal of Physical Chemistry B*, **108**, 7037-7046 (2014).

149. Qian, H. Small open chemical systems theory and its implications to Darwinian evolutionary dynamics, complex self-organization and beyond. *Communications in Theoretical Physics*, **62**, 550-554 (2014).

150. Zhou, J. X., Pisco, A. O., Qian, H. and Huang, S. Nonequilibrium population dynamics of phenotype conversion of cancer cells. *PLoS ONE*, **9**, e110714 (2014).

151. Qian, H. Fitness and entropy production in a cell population dynamics with epigenetic phenotype switching. *Quantitative Biology*, **2**, 47-53 (2014).

152. Lervik, A., Kjelstrup, S. and Qian, H. Michaelis-Menten kinetics under non-isothermal conditions. *Physical Chemistry Chemical Physics*, **17**, 1317-1324 (2015).

153. Ge, H., Qian, H. and Xie, X.S. Stochastic phenotype transition of a single cell in an intermediate region of gene state switching. *Physical Review Letters*, **114**, 078101 (2015).

154. Ma, Y.-A., and Qian, H. A thermodynamic theory of ecology: Helmholtz theorem for Lotka-Volterra equation, extended conservation law, and stochastic predator-prey dynamics. *Proceedings of the Royal Society A: Mathematical, Physical and Engineering Sciences*, **471**, 20150456 (2015).

155. Qian, H. Thermodynamics of the general diffusion process: Equilibrium supercurrent and nonequilibrium driven circulation with dissipation. *European Physical Journal Special Topics*, **224**, 781-799 (2015).

156. Ma, Y.-A. and Qian, H. Universal ideal behavior and macroscopic work relation of linear irreversible stochastic thermodynamics. *New Journal of Physics*, **17**, 065013 (2015).

157. Ge, H. and Qian, H. Nonequilibrium thermodynamic formalism of nonlinear chemical reaction systems with Waage-Guldberg's law of mass action. *Chemical Physics*, **472**, 241-248 (2016).

158. Qian, H., Kjelstrup, S., Kolomeisky, A. B. and Bedeaux, D. Entropy production in mesoscopic stochastic thermodynamics - Nonequilibrium kinetic cycles driven by chemical potentials, temperatures, and mechanical forces (Topical review). *Journal of Physics: Condensed Matter*, **28**, 153004 (2016).

159. Zhang, S.-X., Duan, L.-H., Qian, H. and Yu, X Actin aggregations mark the sites of neurite initiation. *Neuroscience Bulletin*, **32**, 1-15(2016).

160. Del Razo, M.J and Qian, H. A discrete stochastic formulation for reversible bimolecular reactions via diffusion encounter. *Communications in Mathematical Sciences*, **14**, 1741-1772 (2016).

161. Ye, F. X.-F., Wang, Y. and Qian, H. Stochastic dynamics: Markov chains and random transformations. *Discrete and Continuous Dynamical Systems B*, **21**, 2337-2361 (2016).

162. Qian, H., Ao, P., Tu, Y. and Wang, J. A framework towards understanding mesoscopic phenomena: Emergent unpredictability, symmetry breaking and dynamics across scales. *Chemical Physics Letters*, **665**, 153-161 (2016).

163. Ge, H. and Qian, H. Mesoscopic kinetic basis of macroscopic chemical thermodynamics: A mathematical theory. *Physical Review E*, **94**, 052150 (2016).

164. Thompson, L. F. and Qian, H. Nonlinear stochastic dynamics of complex systems, II: Potential of entropic force in Markov systems with nonequilibrium steady state, generalized Gibbs function and criticality. *Entropy*, **18**, 309 (2016).

165. Saakian, D. B. and Qian, H. Nonlinear stochastic dynamics of complex systems, III: Noneqilibrium thermodynamics of self-replication kinetics. *IEEE Transactions on Molecular, Biological, and Multi-Scale Communications*, **2**, 40-51 (2016).

166. Ding, S.-J., Qian, M., Qian, H. and Zhang, X.-J. Numerical simulations of piecewise deterministic Markov processes with an application to the stochastic Hodgkin-Huxley model. *Journal of Chemical Physics*, **145**, 244107 (2016).

167. Ge, H. and Qian, H. Mathematical formalism of nonequilibrium thermodynamics for nonlinear chemical reaction systems with general rate law. *Journal of Statistical Physics*, **166**, 190-209 (2017).

168. Huang, S., Li, F., Zhou, J. X. and Qian, H. Processes on the emergent landscapes of biochemical reaction networks and heterogeneous cell population dynamics - Differentiations in living matters. *Journal of the Royal Society Interface*, **14**, 20170097 (2017).

169. Cao, S., Zhu, X., Zhang, C., Schuttler, H.-B., Gong, J.-P., Qian, H. and Xu, Y. Competition regulation among DNA methylation, nucleotide synthesis and anti-oxidation in cancer vs. normal tissues. *Cancer Research*, **77**, 1-11 (2017).

170. Qian, H. Information and entropic force: physical description of biological cells, chemical reaction kinetics, and information theory (in Chinese). *Scientia Sinica Vitae*, **47**, 257-261 (2017).

171. Jia, C., Zhang, M. Q. and Qian, H. Emergent Lévy behavior in single-cell stochastic gene expression. *Physical Review E (Rapid Communication)*, **96**, 040402 (2017).

172. Ma, Y.-A., Qian, H. and Ye, F. X.-F. Stochastic dynamics: Models for intrinsic and extrinsic noises and their applications (in Chinese). *Scientia Sinica Mathematica*, **47**, 1693-1702 (2017).

173. Zhang, Y., Zhang Z., Qian, H. and Hu, G. Extracting hidden weak sinusoidal signal with short duration from noisy data: Analytical theory and computational realization. *Chinese Physics B*, **26**, 100508 (2017).

174. Ye, F. X.-F., Stinis, P. and Qian, H. Dynamic looping of a free-draining polymer. *SIAM Journal of Applied Mathematics*, **78**, 104-123 (2018).

175. Jia, C., Qian, H. Chen, M. and Zhang, M. Q. Relaxation rates of gene expression kinetics reveal the feedback signs of autoregulatory gene networks. *Journal of Chemical Physics*, **148**, 095102 (2018).

176. Del Razo, M. J., Qian, H. and Noé, F. Grand canonical diffusion-influenced reactions: A stochastic theory with applications to multiscale reaction-diffusion simulations. *Journal of Chemical Physics*, **149**, 044102 (2018).

177. Ge, H., Wu, P., Qian, H. and Xie, X. S. Relatively slow stochastic gene-state switching in the presence of positive feedback significantly broadens the region of bimodality through stabilizing the uninduced phenotypic state. *PLoS Computational Biology*, **14**, e1006051 (2018).

178. Bai, S.-N., Ge, H. and Qian, H. (2018) Structure for energy cycle: A unique status of the Second Law of thermodynamics for living systems. *Science China: Life Sciences*, **61**, 1266-1273.

179. Elson, E. L., Qian, H., Fee, J. A. and Wakatsuki, T. (2019) A model for positive feedback control of the transformation of fibroblasts to myofibroblasts. *Progress in Biophysics and Molecular Biology*, **144**, 30-40.

180. Ye, F. X.-F. and Qian, H. (2019) Stochastic dynamics II: Finite random dynamical systems, linear representation, and entropy production. *Discrete and Continuous Dynamical Systems B*, **24**, 4341-4366.

181. Li, J., Ye, F. X.-F., Qian, H. and Huang, S. (2019) Time dependent saddle node bifurcation: Breaking time and the point of no return in a non-autonomous model of critical transitions. *Physica D: Nonlinear Phenomena*, **395**, 7-14.

182. Qian, H., Wang, S. and Yi, Y. (2019) Entropy productions in dissipative systems. *Proceedings of the American Mathematical Society*, to appear.

183. Huang, W., Qian, H., Wang, S., Ye, F. X.-F. and Yi, Y. (2019) Synchronization in discrete-time discrete-state random dynamical systems. *SIAM Journal on Applied Dynamical Systems*, to appear.

184. Hong, L., Qian, H. and Thompson, L.F. (2019) Representations and metrics in the space of probability measures and stochastic thermodynamics. submitted to *Journal of Computational and Applied Mathematics*,

185. Wang, Y. and Qian, H. (2019) Mathematical representation of Clausius' and Kelvin's statements of the second law and irreversibility.

186. Cheng, Y.-C., Wang, W. and Qian, H. (2019) Gibbsian statistical ensemble theory as an emergent limit law in probability.

187. Ye, F. X.-F., Ma, Y.-A. and Qian, H. Estimate exponential memory decay in Hidden Markov model and its applications.

Proceedings and Book Chapters on Research

1. Qian, H. and Elson, E.L. 3-D Fluorescence Correlation Spectroscopy in Bulk Solution. *Proceedings of the Society of Photo-Optical Instrumentation Engineers*, **909**, 352-359 (1988)

2. Qian, H. and Elson, E.L. Fluorescence Microscopic Analysis of Molecular Interactions in 3-Dimensional Samples by Means of Fluorescence Correlation Spectroscopy and Photo-bleaching Recovery. *Proceedings of Electron Microscopy Society of America*, **46**, 38-39 (1988).

3. Elson, E.L. and Qian, H. Interpretation of Fluorescence Correlation Spectroscopy and Photobleaching Recovery in terms of Molecular Interactions. *Methods in Cell Biology*, **30**, 307-332 (1989).

4. Elson, E.L. and Qian, H. Measurements of Molecular Transport in Small Systems. In *Cell Biology*, (B. Goldstein & C. Wofsy Eds) *Lectures on Mathematics in the Life Science*, **24**, 37-49 (1994).

5. Bassingthwaighte, J.B., Li, Z., and Qian, H. Blood Flows and Metabolic Components of the Cardiome. *Progress in Biophysics & Molecular Biology*, **69**, 445-461 (1998).

6. Bassingthwaighte, J.B., Li, Z., and Qian, H. The Cardiome Project: A Integrated View of Cardiac Metabolism and Regional Mechanical Function. In *Oxygen Transport to Tissue*, **21**, Kluwer Academic/Plenum Publisher, 541-553 (1999).

7. Qian, H. and Elson, E.L. Strain-Dependent Fluorescence Correlation Spectroscopy: Proposing a New Measurement for Conformational Fluctuations of Biological Macromolecules. In *Fluorescence Correlation Spectroscopy*: *Theory and Applications* (E.L. Elson & R. Rigler eds.) *Springer Series in Chemical Physics*, **65**, 65-83 (2001).

8. Qian, H. Fractional Brownian Motion and Fractional Gaussian Noise. In Processes with Long-Range Correlations: Theory and Applications (G. Rangarajan & M.Z. Ding eds.) Springer Lecure Notes in Physics, 621, 22-33 (2003).

9. Beard, D.A., Qian, H., and Bassingthwaighte, J.B. Stoichiometric Foundation of Large-Scale Biochemical System Analysis. In *Modelling in Molecular Biology* (G. Ciobanu & G. Rozenberg, eds.), Springer Natural Computing Series, 1-19 (2004).

10. Beard, D.A. and Qian, H. Constraint-based Modeling of Metabolomic Systems. In *Encyclopedia of Genetics, Genomics, Proteomics, and Bioinformatics*, Vol. 3: Proteomics (M. Dunn, ed.), Sec. 8: Systems Biology (R.L. Winslow, ed.), John Wiley & Sons, (2005).

11. Bassingthwaighte, J.B., Chizeck, H.J., Atlas, L.E., and Qian, H. Multiscale modeling of cardiac cellular energetics. In *The Communicative Cardiac Cell* (S. Sideman, R. Beyar & A. Landesberg, eds.) *Annual of the New York Academy of Science*, **1047**, 395-426 (2005).

12. Qian, H. and Elson, E.L. Chemical fluxes in cellular steady states measured by fluorescence correlation spectroscopy. In *Single Molecule Spectroscopy in Chemistry, Physics and Biology* (Nobel Symposium: Springer Series in Chemical Physics, Vol. **96**, A. Gräslund, R. Rigler & J. Widengren, eds.) Springer, 119-137 (2009).

13. Shi, P.-Z. and Qian, H. Irreversible stochastic processes, coupled diffusions and systems biochemistry. In *Frontiers in Computational and Systems Biology* (Computational Biology Series, Vol. 15, J.-F. Feng, W.-J. Fu & F.-Z. Sun, eds.) Springer-Verlag, 175-201 (2010).

14. Ge, H. and Qian, H. Chemical master equation. In *Springer Encyclopedia of Systems Biology* (W. Dubitzky, O. Wolkenhauer, K.-H. Cho & H. Yokota, eds.) Springer, 396-399 (2013).

15. Qian, H. and Ge, H. Stochastic processes, Fokker-Planck equation. In Springer Encyclopedia of Systems Biology (W. Dubitzky, O. Wolkenhauer, K.-H. Cho & H. Yokota, eds.) Springer, 2000-2004 (2013).

16. Qian, H. Chemical reaction kinetic perspective with mesoscopic nonequilibrium thermodynamics. In *Complexity Science: An Introduction* (M. A. Peletier, R. A. van Santen & E. Steur, eds.) World Scientific, 347-373 (2019).

Book Reviews

1. ***Stochastic Processes in Quantum Physics*** by Masao Nagasawa, *SIAM Review*, **43**, 218-220 (2001).

2. ***An Introduction to Chaos in Nonequilibrium Statistical Mechanics*** by J. R. Dorfman, *Bulletin of Mathematical Biology*, 63, 597-601 (2001).

3. ***Computational Molecular Biology: An Algorithmic Approach*** by Pavel A. Pevzner, *SIAM Review*, **43**, 733-735 (2001).

4. ***Mathematical Physiology*** by James Keener and James Sneyd, *SIAM Review*, **46**, 587-590 (2004).

5. ***Molecular Modeling and Simulation: An Interdisciplinary Guide*** by Tamar Schlick, *SIAM Review*, **47**, 843-845 (2005).

6. ***Theory and Applications of Stochastic Processes: An Analytical Approach*** by Zeev Schuss, *SIAM Review*, **53**, 205-207 (2011).

7. ***Random Perturbations of Dynamical Systems (3rd edition)*** by Mark I. Freidlin and Alexander D. Wentzell, *SIAM Review*, **55**, 569-574 (2013).

8. ***Stochastic Chemical Kinetics: Theory and (Mostly) Systems Biology Applications*** by Péter Érdi and Gárbo Lente, *SIAM Review*, **57**, 475-477 (2015).